and sulphate of copper. The substances sometimes employed to colour sweetmeats, liqueurs, jellies, &c., include some of the most fatal poisons, such as the acetate, arsenite, and carbonate of copper, chromate and iodide of lead, and the sulphides of arsenic and mercury. Indeed, we well remember going over a sweetmeat manufactory, and on remarking on the bright yellow colour of some large comfits we were told that chrome yellow was employed to produce it, our informant evidently having no idea that the substance is a most virulent poison. A long article is devoted to the adulteration and fabrication of wines, and the "plastering" and "fortifying" of sherries is discussed at length. In all cases the most recent results are given, and the work is well edited and carefully written. A glossary at the end of the book will be found useful both to the analyst and the student.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

"The Unseen Universe"

We have read with satisfaction (NATURE, vol. xii. p. 41), your very candid and fair *précis* of our recent work, "The Unseen Universe." There are, however, one or two comments added in which the writer seems to have misapprehended our meaning, possibly from the fact that in the first edition of such a work the arrangement may be regarded as not having quite taken its final shape.

To begin, we fail to understand what the reviewer means when he says, "It is a mere theological dogma to say that what energy perishes in the visible passes into the invisible universe; and the dogma is worthless as a physical principle on which to build any physical reasoning."

Our views will be found on p. 159 of our book: "*May we not say that when energy is carried from matter into ether it is carried from the visible into the invisible?*" Surely the ether may be looked upon as forming part of the invisible universe, and also as having received a large portion of the energy which was once attached to visible matter.

Our object was to show that we introduced no new dogma inconsistent with the received ideas regarding energy, inasmuch as these contemplate an invisible universe as truly as we ourselves do.

The second point upon which we would remark is the assertion of the reviewer that by regarding the visible universe as an infinite whole, the arguments on which its end and its beginning are inferred seem to vanish. In reply to this we would remark, that even allowing (which we are not disposed to allow) that the visible universe is infinite, this would not affect our argument against its past eternity. Our argument (see p. 127 of the book) is, that *the dissipation of the energy of the visible universe proceeds*, pari passu, *with the aggregation of mass, and the very fact therefore that the large masses of the universe are of finite size is sufficient to assure us that the process cannot have been going on for ever.*

THE AUTHORS OF "THE UNSEEN UNIVERSE."

Sense of Humour and Reason in Animals

In the recently published edition of the "Descent of Man" there is some additional matter concerning the above subjects, and as the following illustrative cases fell under my own observation, I think it is worth while to publish them as supplementary to those adduced by Mr. Darwin.

Several years ago I used to watch carefully the young Orang Outang at the Zoological Gardens, and I am quite sure that she manifested a sense of the ludicrous. One example will suffice. Her feeding-tin was of a somewhat peculiar shape, and when it was empty she used sometimes to invert it upon her head. The tin then presented a comical resemblance to a bonnet, and as its wearer would generally favour the spectators with a broad grin at the time of putting it on, she never failed to raise a laugh from them. Her success in this respect was evidently attended with no small gratification on her part.

I once had a Skye terrier which, like all of his kind, was very intelligent. When in good humour he had several tricks, which I know to have been self-taught, and the sole object of which was evidently to excite laughter. For instance, while lying upon one side and violently grinning,* he would hold one leg in his mouth. Under such circumstances nothing pleased him so much as having his joke duly appreciated, while if no notice was taken of him he would become sulky. On the other hand, nothing that could happen displeased him so much as being laughed at when he did not intend to be ridiculous. Mr. Darwin says:—"Several observers have stated that monkeys certainly dislike being laughed at" (p. 71). There can be little or no doubt that this is true of monkeys; but I never knew of a really good case among dogs save this one, and here the signs of dislike were unequivocal. To give one instance. He used to be very fond of catching flies upon the window-panes, and if ridiculed when unsuccessful, was evidently much annoyed. On one occasion, in order to see what he would do, I purposely laughed immoderately every time he failed. It so happened that he did so several times in succession—partly, I believe, in consequence of my laughing—and eventually he became so distressed that he positively *pretended* to catch the fly, going through all the appropriate actions with his lips and tongue, and afterwards rubbing the ground with his neck as if to kill the victim: he then looked up at me with a triumphant air of success. So well was the whole process simulated, that I should have been quite deceived, had I not seen that the fly was still upon the window. Accordingly I drew his attention to this fact, as well as to the absence of anything upon the floor; and when he saw that his hypocrisy had been detected, he slunk away under some furniture, evidently very much ashamed of himself.

The following example of *reason* in a dog is the most striking that has ever fallen within my personal observation. A son of the above-mentioned terrier followed a conveyance from the house at which I resided in the country, to a town ten miles distant. *He only did this on one occasion*, and about five months afterwards was taken by *train* to the same town as a present to some friends there. Shortly afterwards I called upon these friends in a different conveyance from the one which the dog had previously followed; but the latter may have known that the two conveyances belonged to the same house. Anyhow, after I had put up the horses at an inn, I spent the morning with the terrier and his new masters, and in the afternoon was accompanied by them to the inn. I should have mentioned that the inn was the same as that at which the conveyance had been put up on the previous occasion, five months before. Now, the dog evidently remembered this, and, reasoning from analogy, inferred that I was about to return. This is shown by the fact that he stole away from our party—although at what precise moment he did so I cannot say, but it was certainly *after* we had arrived at the inn; for subsequently we all remembered his having entered the coffee-room with us. Now, not only did he infer from a single precedent that I was going home, and make up his mind to go with me; but he also further reasoned thus:—"As my previous master lately sent me to town, it is probable that he does not want me to return with him to the country: therefore, if I am to seize this opportunity of resuming my poaching life, I must now steal a march upon the conveyance. But not only so, my former master may possibly pick me up and return with me to my proper owners: therefore I must take care only to intercept the conveyance at a point sufficiently far without the town, to make sure that he will not think it worth his while to go back with me." Complicated as this train of reasoning is, it is the simplest one I can devise to account for the fact, that slightly beyond the *third* milestone the terrier was awaiting me—lying right in the middle of the road with his face towards the town. I should add that the

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* This habit of violently grinning is not, I believe, uncommon among Skye terriers—the pure original breed of Skyes, I mean, and not the broad-nosed shaggy-coated animals which have almost supplanted them. The habit is very remarkable, for there can be no doubt, I think, that it is intended to imitate laughter. Many intelligent dogs understand the meaning of laughter as implying good humour. I have a setter just now, which always rouses up and whines for admittance to a room when he hears a good laugh going on, wagging his tail the while, in proportion to the varying intensity of the laughter; but I do not know of any other breed of dogs which actually *imitates* it—at all events not with such evident purpose as do Skye terriers. The purpose is evident, not only because the gesture is never made at any other time than when the animal wishes to be particularly agreeable; but also because the grin is carried to a highly unnatural degree—much more, *e.g.*, than the strongest snarl would require; and, which is stranger still, I have frequently seen my terrier on such occasions shaking his sides in a convulsive manner—an action he never performed at any other time.

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second two miles of the road were quite straight; so that I could easily have seen the dog if he had been merely running a comparatively short distance in front of the horses. Why this animal should never have returned to his former home on his own account, I cannot suggest; but I think it was merely due to an excessive caution which he also manifested in other things. Be the explanation of this, however, what it may, as a fact he never did venture to come back upon his own account, notwithstanding there never was a subsequent occasion upon which any of his former friends went to the town but the terrier was sure to return with them, having always found some way of escape from his intended imprisonment.

Regent's Park, N.W. GEORGE J. ROMANES

Equilibrium of Gases

IN a former letter (NATURE, vol. xi. p. 486) I ventured to express an opinion contrary to that of most authorities, that the temperature of a vertical column of gas at rest would tend to diminish from below upwards.

I then stated that there was nothing to counteract the tendency to the upward diminution of energy which must result from gravitation. I am indebted to Mr. S. H. Burbury for pointing out to me that a counter-action exists in the removal from the system, at every point of the ascent, of those molecules whose vertical energy at that point is *nil*. The total mean energy of the molecules may thus remain the same, although a constant deduction is made from the energy of every molecule remaining in the system.

Mr. Murphy's argument (NATURE, vol. xii. p. 26) from the absence of cumulus in the Arctic regions, is also a sound one as far as it goes, and fairly counterbalances that derived from tropical calms and storms.

I must therefore withdraw my dissent from the generally received doctrine of the tendency to equality of temperature in a vertical column. R. C. NICHOLS

Athenæum Club, May 20

Contributions to the Natural History of the Wolf (*Canis pallipes*) of Northern India

HAVING had the opportunity of examining a number of wolf-cubs, it may not be without some interest to record my observations in your useful journal.

This year (1874–75) I examined fourteen batches or litters of wolf-cubs between December 18 and February 1. Judging from the apparent ages of the different litters, I should fix the breeding time of the wolf from about the middle of October to about the end of December. But the majority are bred in December, as out of the fourteen batches I could approximately fix the birth of eleven of them in some date of December. On the 29th of December a full-grown she-wolf, in milk, was brought to me, with seven cubs, which appeared to be about a week old. She had ten teats. The eyes and ears of the cubs were closed; their ears were drooping; their general superficial colour was sooty brown, with an under colour, that is, at the roots of the hairs, of dirty light tan. The latter colour was more marked on the head and flanks, while the sootiness was more decided on the hinder part of the body. They all had a milk-white chest-spot varying in size. Six of them had white hairs at the tips of their tails.

All those I examined, of about this same age, had similar characters. When the eyes of young wolves open, and they begin to crawl, about the third week, their general colour is a dirty light tan, washed with soot. As they grow, their ears become erect, their general colour a uniform light tan, with only the tips of the hairs dark, the tail being the darkest part of the animal. After the sixth week or so, the white chest-spot emerges into the light fawn colour of the remainder of the chest, and a dark collar on the under part of the neck becomes visible. This collar looks as if dark grey ashes were brushed across the greyish white of the neck. All those I examined which looked older than four or five weeks had this collar. But it disappears again as the wolf gains its adult colouring, becoming merged into the uniform creamy white of the neck and chest. Out of seventy-nine wolf-cubs which I examined, all but one had a white chest-spot, varying in size from a few hairs to a patch the size of a rupee. Fourteen of them had white tips to their tails, varying in size. Seventeen of them had white tips to one or more of their feet. These white marks leave no doubt about the close relationship between the wolf and the domestic dog. The sex of seventy-four cubs was noted, belonging to thirteen litters. Forty were males, and thirty-four were females. The number of young at a birth was from three to eight.

Lucknow E. BONAVIA

OUR ASTRONOMICAL COLUMN

1 LEPORIS (FL.).—This star is wanting in both Argelander's *Uranometria* and in Heis's Atlas, though the estimations of magnitude are very accordant; indeed, with the exception of Lalande, who calls it 6½ observers including Flamsteed, Bradley, Piazzi, and Johnson appear to have uniformly estimated it . It is 48′ *s.p.* ε Leporis, a star of the 4th magnitude. Baily has this note: "The star is designated as of the 9th magnitude in the *British Catalogue*; but I apprehend this is a typographical error, as it is stated to be the 6th in the original entry." Yet, the star having been omitted by Argelander, and particularly by Heis, there remains a suspicion of variability of light.

THE COMET OF DECEMBER 1872 (KLINKERFUES—POGSON). The observation of a telescopic comet by Mr. Pogson, at Madras, on the mornings of December 3 and 4, 1872, in consequence of a telegraphic message from Prof. Klinkerfues, of Göttingen, that Biela's Comet had "touched the earth" on November 27, and might be sought for near the star θ Centauri, will be fresh in the recollection of our astronomical readers. The remarkable shower of meteors on that evening had exhibited a radiant almost identical in position, with the diverging point, which meteors moving in the orbit of Biela's Comet would have, and hence the assumption of our close proximity to this body during the meteoric display. Places of the comet detected by Mr. Pogson in the first interval of favourable weather after receiving the telegram were communicated by him in the same month to the Astronomer Royal and Prof. Klinkerfues, but without details of the observations upon which they were founded. With the aid of these positions the question of identity of Pogson's Comet with one of the bodies forming Biela's Comet was examined. There was at the outset this difficulty in the way of entertaining the idea of identity, that if Biela's Comet were actually close to the earth on the evening of November 27, its perihelion passage would have taken place on the 27th of the following month, ten or eleven weeks later than the date indicated by Michez's orbit as perturbed to 1866; nevertheless, since the comet was not detected in 1865-66, in the track it should have followed according to Michez's calculations, though the largest telescopes were employed in a search for it, there remained the possibility of disturbance of the mean motion in 1852, when observations were last obtained, from some unknown cause. Klinkerfues, therefore, assuming the elements of Biela's Comet, examined their relation to Pogson's places, and arrived at the conclusion that the identity of the comet observed at Madras with one of the two Biela comets could hardly be doubted. Subsequently, Prof. Oppölzer, of Vienna, gave attention to the subject: he remarked that with Michez's orbit of Biela, Pogson's observations were not represented upon any supposition as to date of perihelion passage, but with the semi-axis of Biela, and assumed small distances of the comet from the earth at the time of the Madras observations, he deduced several sets of the other elements bearing greater or less similarity to those of Biela, and indicating a very near approach to the earth on November 27th: his conclusion was, that Pogson's Comet stands with high probability in intimate connection with the meteor-shower of that evening; and it is at least possible that the observed object was really one of the heads of Biela.

Since these investigations, the full details of the Madras observations have been published in the *Astronomische Nachrichten*, and Prof. Bruhns, of Leipsic, has

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